Book Review: Soepadmo. E., L.G. Saw and R.C.K. Chung. (eds.). 2002. **Tree Flora of Sabah and Sarawak. Volume 4.** Sabah Forestry Department. Forest Research Institute Malaysia. Sarawak Forestry Department. xii + 388 pp. ISBN 983-2181-27-5 (Vol. 4). Price: RM 100 or US$ 100.

The ambitiousness of this project should not be underestimated. Northern Borneo contains. for its area. the largest lowland tree flora of anywhere in the Old World. and possibly anywhere. When the work is completed. the 75.000 square miles of Sabah and Sarawak may have been found to contain in excess of 5.000 tree species. This is the first flora for a major region of Borneo. Merrill's *Bibliographic Enumeration of Bornean Plants* (Journal Straits Branch Royal Asiatic Society. Special Number. 1921). extended by Masamune (*Enumeratio Phanerogamarum Bornearum*. 1942) contains but a rudimentary and outdated base. The regional *Flora Malesiana* provides an invaluable foundation. but hardly more than one third of the families have yet been treated by that great enterprise. while a close regional scrutiny is permitting more discriminating taxon recognition. Tim Whitmore. K.M. Kochummen and Francis Ng's groundbreaking *Tree Flora of Malaya* (Longmans. 1972-89). which treated just under 3000 species over 24 years. was based on a vastly greater previous botanical corpus including King's *Materials for a Flora of the Malay Peninsula* (1896) and Ridley's *Flora of the Malay Peninsula* (Reeves. 1922-25).

At a time when biological research in Malaysia is somewhat in the doldrums. Engkik Soepadmo and his colleagues are succeeding. overall. in a genuinely indigenous enterprise while determinedly holding to international standards. They have used the Flora project to train a new cadre of taxonomists. who have contributed many of the families. The editors are also committed to meet the needs of both professional taxonomists and the wider professional and public user. by minimizing technical jargon. by including identification keys primarily or entirely based on readily observable characters. and by providing summary information on ecology and uses.

Overall. while recognizing that shortcomings in a project with such ambitious goals are inevitable. the editors have succeeded to a remarkable extent. To my knowledge. no comparable indigenous project for a field-based and user-friendly critical flora has been undertaken elsewhere in the tropics. Particularly commendable are the keys. which. to varying extent admittedly according in part to the field knowledge of the authors. put major emphasis on vegetative over reproductive characters. This is vital for a region in which flowering among canopy trees fluctuates vastly between years. and in which reproduction is often scant for at least half the year.

The insistence on citation of types, and on substantiating species concepts and geographical range by citation of selected specimens, provides an invaluable test of rigour. High quality whole page botanical illustrations of selected species from each genus are provided. There are indices to both vernacular and scientific names.

Volume 4 is dedicated to our late friend and colleague Tim Whitmore; the gracious dedication identifies Tim as both creative spirit and driving force behind the *Tree Flora of Malaya*, which provided the model for the current flora. This volume includes treatments of 6 families, 24 genera and 321 species; of the latter, 45 (14%) are new to science, thereby indicating the inadequate extent of previous knowledge in spite of the achievements of *Flora Malesiana*. Overall, 47% of the species treated are endemic to Borneo and just under half of these are endemic to Sabah and Sarawak, offering dramatic evidence of the validity of northern Borneo as a global biodiversity hotspot. Four of the families, including the three largest, are authored by Malaysian specialists.

The true test of the quality of a flora must be by its use in the field, as well as the herbarium. This reviewer knows the families treated as a naturalist rather than a specialist, and it would be presumptuous to offer a detailed critique before my next visit to the field.

Ebenaceae, by Francis Ng, includes the 75 ebonies of Sabah and Sarawak. An informative introduction provides, after generic definition, extensive details on geography, ecology, biology and uses, and is clearly the work of someone who knows his material as living organisms. Curiously, bark and architecture descriptions are hidden within a section on taxonomy rather than under the generic definition. The key relies substantially on fruit, as well as vegetative characters, but not at all on flowers. This implies that vegetative characters alone are insufficient. It would have been useful to have included discussion of the best means to distinguish the most vegetatively similar species in footnotes under their descriptions, if impractical in the key. Previously recognized subspecies have often been suppressed. For instance it may be, as the author states, that continuous variation between *Diospyros sumatrana* subspecies *decipiens* and *sumatrana* exists in the herbarium, but my experience is that they are sufficiently distinct both in habitat and morphology in the field to merit sustainment as subspecies. More discussion of such variation, which seems to occur in several *Diospyros*, would have been useful even if a conservative decision is finally made. Overall, though, I found this to be a masterly treatment, and an excellent spur for us field biologists to further advance knowledge of the family.

Sapotaceae, with 11 genera and 121 species in Sabah and Sarawak. is treated by a team of eight botanists: seven from the Sarawak Herbarium. Kuching, and Joan Pereira from Sandakan Herbarium, under the overall editorship of Paul Chai and P.C. Yii at Kuching with varying but clearly substantial input from senior editor Engkik Soepadmo. Sapotaceae is a notoriously difficult family sharing, with Lauraceae, complex and difficult generic definition, which must rely on reproductive characters. The treatment suffers from the substantial disadvantage, therefore, of having a generic key that starts with and continues to use reproductive characters at major divisions, preventing its use in field ecological and other surveys. In my experience, at least the majority of entities are recognizable in the field, albeit not through resort to generic characters. I remain convinced that an additional key to all 121 species, based on field and if necessary ecological characters, would have been feasible. Of the larger genera *Madhuca,* 47 species treated, is by Yii and Chai; *Palaquium,* 41 species, by Abang Mohtar with assistance from Soepadmo. *Payena,* 12 species, by Pereira, and *Pouteria,* 7 species. by Stephen Teo. In all. seemingly workable keys are provided, based mostly or entirely on vegetative characters. Infraspecific categories, we are informed, are eliminated, being either raised to species rank or rejected; but nowhere in this family treatment are taxonomic explanatory footnotes provided beneath the species descriptions; these could have also helped overcome difficulties presented by the problematic generic key. It does seem curious that species new to science are described only in the quite small genus *Payena,* with a remarkable 5, and *Madhuca*, with 7. This might reflect differing species concepts among the authors, alternatively differing knowledge and attention to detail; the texts overall suggest the latter.

Oleaceae, with 6 genera and 47 species by Ruth Kiew, is a masterly account of a family that is the author's speciality. Again, it appears not to be possible to reliably identify the three tree genera *Chionanthus, Ligustrum* and *Olea* on vegetative characters. Some explanatory comments would have again been helpful here: Do not the inflorescences, or at least their abscission scars, remain on the twigs? The species descriptions are particularly clear in this family and brief footnotes are often provided, though rather little is offered on ecology. This author alone described new species and combinations with extensive taxonomic notes in a useful appendix in the volume

The treatments of the remaining, small, families are all competent. Aquifoliaceae, by Susyn Andrews, has a valuable introductory field key. There is no habit description of *Ilex*, nor allusion to the distinctive upper surface of the dry leaf. As might be expected from an author from outside the region, the ecological information is variable. Lecythidaceae, by Michelle

Pinard, is serviceable, with keys primarily relying on field characters. It had the advantage of Hans Payens' prior treatment in Flora Malesiana. I find *Barringtonia* species often difficult to identify; more footnotes would have been welcome. Proteaceae, by Richard Chung, aided by Hans Sleumer's treatment in Flora Malesiana, provides a competent and clearly useable account of this rather easy family, enriched by a surprising number of novelties.

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